

A6

21. (Amended) The method of claim 17, wherein the stable suspension comprises a saturated solution of ammonium sulfate, and the suspension is up to about 15% PAM by weight.

REMARKS

In the office action mailed February 14, 2003, the examiner rejected claims 1-15, and 17-23. Applicant's representative is pleased to acknowledge that the examiner also allowed claims 24-25 and merely objected to claim 16 as being dependent on a rejected claim. Applicants note that the examiner made no comment regarding claim 11, and that it recites limitations that are similar to those recited in claim 16, which was merely objected to.

Before addressing the specifics of the office action, Applicants wish to point out that claims 3, 9, 10, 12, 15, 17, 20, and 21 have been amended to correct defects as to form so as to satisfy the requirements of 35 U.S.C. §112, second paragraph. None of the amendments are believed to change or limit the scope of any claim, add new subject matter, or raise new issues, nor are they intended to.

Claims 3, 9, 10, 12, 15, and 20 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant considers the invention. The examiner stated that in claims 3, 9, 10, 15 and 20 had improper Markush terminology. Claims 3, 9, 10, 15, and 20 are amended. With regard to claim 12, the examiner stated that the recitation of "that suitable" is unclear. Claim 12 is also amended. Applicants respectfully submit that the amendments place these claims in compliance with 35 U.S.C. §112, second paragraph.

The examiner also rejected claims 17-23 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant considers the invention. The examiner stated that in claim 17 the recitation of "that at least" is indefinite, and suggested that the word —is— should be inserted after "that" to avoid this rejection. Claim 17 is amended as suggested, and claims 17-23 should now comply with the statute.

The examiner additionally rejected claims 2-4, 8-10, 14-15, and 20 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant considers the invention. With respect to claims 3, 9, 10, 15, and 20, the examiner stated:

It is unclear whether these claims require the presence of an ammoniated salt, since the claims recite 'ammoniated salt is selected from the group comprised of ammonium sulfate, ammonium nitrate, urea and thiourea', but urea and thiourea are not ammoniated salts.

With respect to claims 2, 4, 8, and 14, the examiner stated:

It is indefinite as to what would constitute an 'ammoniated salt'. For example, it is indefinite as to whether an "ammoniated salt" is required to be an ammonium salt.

Applicants respectfully submit that the term "ammoniated salt" is definite, and that each of the salts recited in these claims is an "ammoniated salt" as commonly understood by those of ordinary skill in the art. The chemical formula for free ammonia is NH₃. When combined with other elements to form a salt, the ammonia either picks up an extra proton to become ammonium (NH₄⁺), which is an anion, or loses a proton to become an amido cation (NH₂⁺). Both ammonium salts and amido salts are understood to be ammoniated salts and may be referred to as such. Therefore, urea (NH₂CONH₂),

and thiourea (NH_2CSNH_2), each of which having two amido groups, are both ammoniated salts. Moreover, this is how these salts are referred to in the specification of the present application (See, e.g., paragraph [0031]). One of ordinary skill in the art reading these claims in light of the specification would therefore understand the meaning of the term "ammoniated salt", and would also understand that urea and thiourea as recited in the claims are indeed ammoniated salts. Applicants submit that the rejected claims comply with the statute and respectfully request that the examiner withdraw this rejection.

The examiner also rejected claims 20 and 21 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant considers the invention. The examiner pointed out that there is no antecedent basis for "the ammoniated salt." Claims 20 and 21 are amended and now are definite.

The examiner also rejected claims 1, 5-7, 12 and 13 under 35 U.S.C. §103(a) as being unpatentable over Brigance et al. The examiner stated:

Brigance et al. discloses a polyacrylamide liquid emulsion/dispersion in paragraph [0020]. The liquid polyacrylamide dispersion of Brigance et al. would presumably be stable, since it exists. The difference between the dispersion disclosed by Brigance et al., and that recited in applicant's claims 1, 4-7, 12 and 13, is that Brigance et al. does not specifically disclose that the dispersion is an aqueous dispersion. It would be prima facie obvious to employ an aqueous emulsion/dispersion as the liquid emulsion/dispersion of polyacrylamide of Brigance et al., since one of ordinary skill in the art would recognize that water would be a convenient solvent, and would not be incompatible with the resulting fertilizer composition. Regarding claims 5 and 6, it would be within the skill of one of ordinary skill in the art to determine a suitable or optimum particle size for the polyacrylamide particles to be dissolved in the aqueous solvent. Regarding claim 7, it would be prima facie obvious to employ a suspension comprising at least 2.5% polyacrylamide by weight, since it would be within the skill of one of ordinary skill in the art to determine a suitable or optimum concentration of polyacrylamide to employ in the liquid emulsion/dispersion of Brigance et al.

Applicants respectfully traverse the rejection. Claim 1 recites "A stable suspension of water-soluble polyacrylamide particles in an aqueous medium." This is neither disclosed nor suggested by the art applied by the examiner. As the examiner points out, Brigance et al. discloses an emulsion/dispersion, but does not disclose a suspension of polyacrylamide in *an aqueous medium*. While "a stable suspension of water-soluble PAM particles in an aqueous medium", as recited in claim 1, may have been desired by those of ordinary skill in the art, neither Brigance et al., nor any other art cited by the examiner or in the application would teach that hypothetical person of ordinary skill in the art how to go about making such a suspension in an aqueous medium. It is also pure conjecture that the hypothetical aqueous suspension desired by the hypothetical person of ordinary skill in the art would also be stable, as also recited in claim 1.

As described by applicants in the Background section of the application, water-soluble polyacrylamide is not easy to use, and is very difficult to obtain in high concentrations in a flowable form. Santini et al, US Patent No. 5,548,020, which was described by applicants at paragraph [0011] of the specification, discloses an oil or kerosene -based emulsion of polyacrylamide, which is not unlike the emulsion/dispersion disclosed in Brigance et al. The Santini emulsion is viscous and expensive, and not appropriate for agricultural purposes.

The specification of this application also points out some of the problems encountered when putting polyacrylamide into water. High concentrations of polyacrylamide are difficult to obtain in solution in an aqueous medium, and undissolved particles tend to clump up in large agglomerations rather than go into suspension (see

paragraph [0009]). Other particles that do dissolve in the aqueous medium form a gel-like, difficult to use mess. None of the prior art of record in this or the parent application disclose any teaching or would suggest how to form a stable suspension of water-soluble polyacrylamide particles in an aqueous medium, as recited in claim 1 and included in claims 2-13 that depend from claim 1. The present invention has solved an important problem, and satisfied a long felt need.

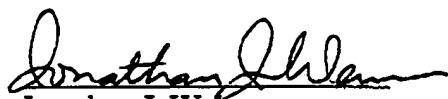
As recited in certain claims, the particles in stable suspension have a low enough viscosity to be suitable for agricultural purposes, such as applying to soil with spray irrigators. In other claims, applicants recite suspensions with high PAM concentrations. None of the prior art provides a specific teaching or suggestion of these combinations of features. Applicants, on the other hand, have created a new composition of matter that satisfies these long-felt needs.

The examiner specifically called attention to certain aspects of dependent claims. The particle size ranges recited in claims 5 and 6 are preferred embodiments that help enable the particles to quickly dissolve when the suspension is diluted. The concentrations recited in claim 7 provide a preferred concentration range. There is nothing in the art of record that would lead that person of ordinary skill to produce a stable, aqueous suspension of water-soluble polyacrylamide with such concentrations. Claim 12 recites a low-viscosity feature of the invention, which is a feature the emulsions and clumpy prior art products certainly cannot claim to teach or suggest.

Applicants respectfully request that the examiner reconsider the claims in light of the amendment and these remarks, and to provide a prompt Notice of Allowance.

Respectfully submitted,

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PATENT
Atty. Docket No. (004/003001)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Charles A. Arnold et al.
Serial No.: 09/843,608
Filed: 04/26/2001
Title: POLYACRYLAMIDE SUSPENSIONS FOR SOIL CONDITIONING

Mail Stop Non-fee Amendment
Commissioner for Patents
Washington, DC 20231

SUPPLEMENT TO RESPONSE FILED 5/12/2003

AMENDED CLAIMS

Additions in Underline and Deletions in Brackets

3. (Amended) The suspension of claim 2, wherein the ammoniated salt is selected from the group that [includes] consists of ammonium sulfate, ammonium nitrate, urea, and thiourea.

9. (Amended) The suspension of claim 8, wherein the ammoniated salt is selected from the group that [includes] consists of ammonium sulfate, ammonium nitrate, urea, and thiourea.

10. (Amended) The suspension of claim 7, wherein the suspension comprises up to about 5% polyacrylamide by weight, and the ammoniated salt is selected from the group that [includes] consists of ammonium sulfate, ammonium nitrate, and urea.

12. (Amended) The suspension of claim 1, wherein the suspension has a viscosity that is suitable for use in a spray irrigation system.

15. (Amended) The method of claim 14, wherein the salt is selected from the group [comprised] consisting of ammonium sulfate, ammonium nitrate, urea, and thiourea.

17. (Amended) A method of conditioning soil, comprising:
providing a stable aqueous suspension of water-soluble polyacrylamide particles that is at least about 2.5% polyacrylamide by weight;
adding the suspension to an aqueous medium that is not saturated; and spreading the aqueous medium with the polyacrylamide onto the soil.

20. (Amended) The method of claim 17, wherein stable suspension comprises a saturated solution [the ammoniated salt is selected from the group comprised] of one of ammonium sulfate, ammonium nitrate, urea, and thiourea.

21. (Amended) The method of claim 17, wherein the [ammoniated salt is] stable suspension comprises a saturated solution of ammonium sulfate, and the suspension is up to about 15% PAM by weight.

25. The suspension of claim 24, wherein the ammonium salt is ammonium sulfate, and wherein the suspension is about 2.5% -15% by weight polyacrylamide.